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CASE REPORT

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A patient with chest pain and a high-risk ECG pattern: The Wellens' syndrome

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Abstract

This case highlights the ECG interpretation in acute coronary syndrome absence from ST – elevation myocardial infarction. A patient with acute chest pain and biphasic T – waves or deep inverted T- waves in V2–V3 is at risk for myocardial infarction. Timely cardiological assessment and coronary angiography is required.

KEYWORDS

angina pectoris, myocardial infarction, T-wave changes, Wellens' syndrome

1 | INTRODUCTION

An 81-year-old man suffering from acute chest pain presenting in our emergency department. ECG reveals biphasic T-waves in V2–V4. The Wellens' syndrome is associated with left anterior descending artery occlusion. Timely coronary angiography is mandatory to avoid myocardial infarction

The Wellens'syndrome describes characteristic T waves in patients with prior history of chest pain in a pain-free period.[1] This ECG pattern is associated with severe stenosis of left anterior descending artery (LAD).[1] Urgent coronary angiography should be performed to avoid myocardial infarction. In this case, the typical course of a patient with biphasic T-waves is described.

2 | CASE PRESENTATION

An 81-year-old man with history of coronary artery disease (bare metal stent (BMS) implantation LAD 10 years ago) presents by himself at emergency department. He described angina pectoris 2 h ago, at admission the chest pain disappeared. The electrocardiogram (ECG) shows no typical ST-elevation, but biphasic T-waves in V2–V4 (Figure 1). This ECG pattern is called Wellens' syndrome, which is associated with a significant stenosis of the left anterior descending artery. Accordingly, echocardiography showed a hypokinesis of the apex. The high-sensitive troponin increased from 71 ng/L (reference range < 14 ng/L) at admission to 381 ng/L after 1 h, also the creatine kinase increased after 1 h (Table 1). Thereafter, urgent coronary

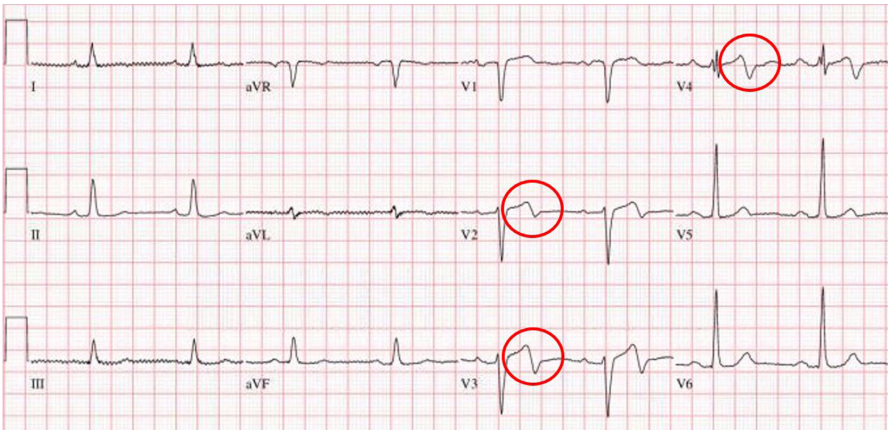

FIGURE 1 Electrocardiogram at admission, the circles highlight biphasic T-waves in V2–V4.

	References	At admission	+ 1 h	+ 1 day
Creatine kinase [U/L]	<171	163	301	135
CK-MB [U/L]	7–25	–	46	–
CK-MB rel. [%]		–	15	–
Troponin [ng/L]	<14	71	381	–

TABLE 1 Cardiac biomarkers at admission, 1 h after admission and 1 day after presentation.

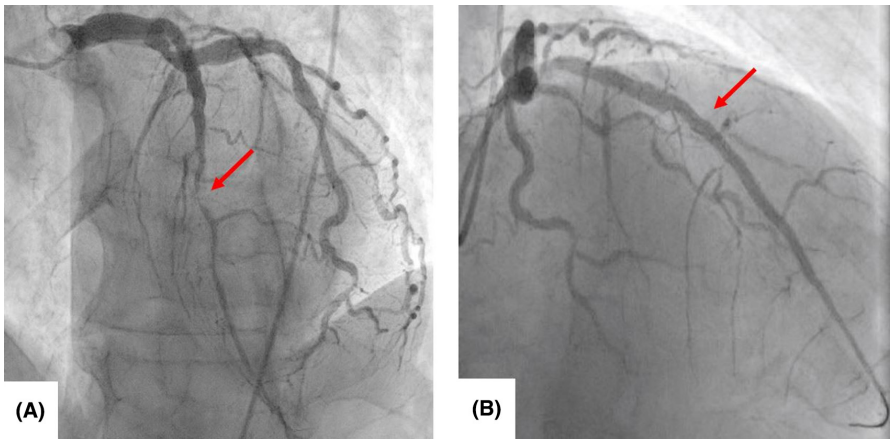

FIGURE 2 Coronary angiography reveals subtotal left anterior descending instent and poststent stenosis (A; LAO 19, CRAN 21), treated by multiple PTCAs and two drug-eluting stents (B; RAO 58 CAUDAL 22).

angiography revealed a subtotal left anterior descending instent and poststent stenosis, which was successfully treated with multiple PTCAs and implantation of two drug-eluting stents (Figure 2). A remaining subtotal stenosis of the right coronary artery was treated by percutaneous coronary intervention (PCI) 6 weeks later. One day after PCI echocardiography showed a preserved left ventricular ejection fraction (LVEF: 65%) with mild hypokinesis of the apex. The patient received a dual antiplatelet therapy and left the hospital 2 days after PCI.

3 | DISCUSSION

Gerson et al. first described exercise-induced U-wave inversion in 92% of patients with more than 75% stenosis of the left anterior descending coronary artery.[2] In 1980, Gerson et al. described the same ECG pattern in patients at rest with LAD or left main ischemia in 89% of cases.[3] Two years after Gerson's findings De Zwan, Wellens et al. described the same ECG abnormality in 18% of patients admitted with unstable angina.[1] In subsequent coronary angiography, severe LAD artery stenosis was detected. 75% of these patients were not investigated by coronary angiography and developed an extensive anterior wall myocardial infarction up to 23 days (mean 8.5 days) after admission. De Zwan and Wellens et al. concluded that patients with this ECG pattern are at high risk to develop anterior wall myocardial infarction due to LAD stenosis.

There are two types of the Wellens' syndrome. Type A is more common (nearly 75%) and describes deep inverted T waves in V2 and V3. Type B (nearly 25% of all cases) shows biphasic T-waves in V2 and V3[4] (Figure 3). Typically, the characteristic ECG changes occurred during a pain-free period.[5]

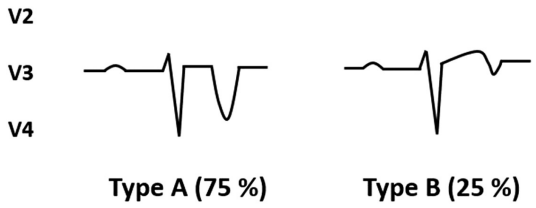

FIGURE 3 Types of Wellens' syndrome: Type A describes deep inverted T waves, and Type B describes biphasic T-waves.

4 | CONCLUSION

Wellens' syndrome is characterized by deep inverted T waves or biphasic T-waves in precordial leads V2–V3 (V4) during a pain-free period, but previously reported chest pain. It's associated with significant LAD stenosis prone to cause deleterious anterior wall myocardial infarction. Emergency physicians should be aware of this ECG pattern, to identify patients with at high risk for anterior wall myocardial infarction. Timely coronary angiography is mandatory.

AUTHOR CONTRIBUTIONS

Sven Baasen: Conceptualization; data curation; investigation; supervision; validation; visualization; writing – original draft; writing – review and editing. **Manuel Stern:** Supervision; writing – original draft; writing – review and editing. **Verena Veulemans:** Supervision; writing – review and editing. **Florian Bönner:** Supervision; writing – review and editing. **Malte Kelm:** Supervision; writing – review and editing. **Lucas Busch:** Conceptualization; project administration; supervision; visualization; writing – original draft; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

None declared.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

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